Registration of Static and Dynamic Biomedical Image Data

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Image data registration, i.e., the process of transforming an image dataset so that the structures represented are properly adjusted to the homologous structures represented in a second image dataset, has been a topic of huge research in Computational Vision. Such transformation has been frequently applied on static image data, but also on dynamic image data, i.e., image sequences. For example, in Biomedical Engineering, computational methods of image data registration have a crucial role in supporting efficient image-based diagnosis, by fusion the information conveyed in image data acquired by different image modalities, at distinct time instants or from several viewpoints. Hence, the computational registration of image data has been a remarkable tool for clinicians and researchers since complex image based tasks, such as the comparison of a given clinical case with previously studied ones, the automatic identification of regions of interest in images (i.e. image segmentation) and information fusion, are facilitated and can be achieved automatically and without subjectivity.

Usually, associated to the topic of image data registration are found methods concerning data matching, i.e. the searching for correspondences between two related images, and data interpolation, specially due to the application of the transformation found to one image in the discrete domain.

During this presentation, the topic of image data registration is going to be introduced, automatic computational methodologies to matching and registering static and dynamic image data that we have been developing are going to be described, and application cases involving static image data, image sequences and image data acquired by different imaging modalities are going to be presented and discussed.